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# Pesticide Fact Sheet Number 44: Propachlor

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This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

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Washington, DC 20460

EPA

# Pesticide Fact Sheet

Name of Chemical: PROPACHLOR
Reason for Issuance:
Date Issued: Feb. 11, 1985
Fact Sheet Number: 44

1. Description of the chemical:

Generic name: 2-Chloro-N-isopropylacetanilide
($C_{11}H_{14}ClNO$)
Common name: Propachlor
Trade name: Ramrod®, Bexton®, and CP 31393
Chemical Abstracts Service (CAS) Registry number: 1918-16-7
Office of Pesticides Program's Internal Control Number: 019101
Year of initial registration: 1965
Pesticide type: Herbicide
Chemical family: Alpha-chloroacetamide
U.S. producer: Monsanto Company

2. Use patterns and formulations:

Application sites: Propachlor is registered for use as a preemergence herbicide on corn (all types), soybeans (seed only), grain sorghum (milo), green peas, pumpkins, cotton and flax. In corn, propachlor can also be applied as an early postemergence control. Sorghum is the largest use site for propachlor, accounting for most uses of the wettable powder formulation. Corn is the second largest use site for propachlor, accounting for most uses of the granular formulation.

Types of formulations: Propachlor is available in granular, wettable powder, and flowable liquid concentrate formulations.

Types and methods of applications: Propachlor is applied as a preemergence broadcast spray or banded ground application, and only one application is allowed per year.

Application rates: 3.0 to 6.0 lbs a.i./A on crop sites.

Usual carriers: Attapulgite/montmorillonite clay and water.

3. Science Findings:

Summary science statements:

Propachlor is not acutely toxic by the oral and dermal routes of exposure. However, primary eye irritation data on propachlor show corrosivity and corneal opacity not reversible within seven days in rabbits. If propachlor came in contact with the eyes, it could cause irreversible eye injury to man. Propachlor may also induce photosensitivity or photosensitization due to the presence of aniline in its composition.

Propachlor is highly toxic to coldwater fish, highly to moderately toxic to warmwater fish and highly to moderately toxic to freshwater invertebrates.

Chemical characteristics:

Propachlor is a light tan solid at room temperature and its molecular weight is 211.70. The boiling point is 110°C at 0.3 mm Hg. Propachlor is soluble in most organic solvents and in water (at 23°C) to 693 ppm.

Toxicological characteristics:

Acute toxicology effects of propachlor are as follows:

Acute oral toxicity in rats: 1.80 g/kg body weight, Toxicity Category III,
Acute dermal toxicity in rabbits: >20.0 g/kg body weight, Toxicity Category IV,
Skin irritation in rabbits: slight irritant, Toxicity Category III,
Eye irritation in rabbits: Corrosivity and corneal opacity not reversible within seven days, Toxicity Category I.

Chronic toxicology effects of propachlor are as follows:

A teratology test in rats has shown that propachlor tested at the highest dose level (HDT), failed to induce teratogenic, fetotoxic or maternal effects. The HDT was 200 mg/kg/day.

Major routes of human exposure:

Non-dietary exposure to propachlor by a farmer as an applicator during mixing, loading , spraying and flagging is probable.

Exposure of humans to propachlor through contamination of ground water and runoff contamination of surface water after heavy Spring precipitation is probable.

The dietary exposure (mg/kg/day) to propachlor by the U.S. population from treated food crops is possible.

Physiological and biochemical behavioral characteristics:

Absorption characteristics: Propachlor is absorbed mainly by germinating seedling shoots, secondarily by roots.
Translocation: Propachlor is translocated throughout the plant, mainly in the vegetative tissues.
Mechanism of pesticidal action: Propachlor is a strong inhibitor of cell elongation and protein synthesis.
Metabolism in plants: Metabolized rapidly in plants.

Environmental characteristics:

Adsorption and leaching in basic soil types: Propachlor is adsorbed by soil colloids.
Microbial breakdown: Microbes are the primary factor in the breakdown of propachlor in soils.
Loss from photodecomposition and/or volatilization: Low.
Average persistence of recommended rates: Half-life of 4 to 6 weeks; longer in soils high in organic matter.

Ecological characteristics:

Avian acute oral toxicity: 91 mg/kg.
Avian eight day dietary toxicity (Bobwhite Quail): > 5,000 ppm.
Avian eight day dietary toxicity (Mallard Duck): > 5,000 ppm.
96 hour fish toxicity: >1.40 ppm for bluegill sunfish (moderately toxic) and 0.17 ppm for rainbow trout (highly toxic).
48 hour aquatic invertebrate toxicity: 7.80 ppm (moderately toxic) for Daphnia magna.

Potential problem for endangered species:

The Office of Endangered Species (USDI) has determined that propachlor use on corn, sorghum or soybeans may impact the following endangered species: Slackerwater darter; eleven freshwater mussels; Woundfin: and Salanograss.

Tolerance assessments:

The Agency is unable to complete a full tolerance reassessment of propachlor because of certain residue chemistry data gaps. The additional residue data requirements may cause specific tolerances to be revised in the future.

The tolerances listed below have not been revised:

| Commodities | Parts per million |
|---|---|
| Beets, sugar, roots | 0.2 |
| Beets, sugar, tops | 1.0 |
| Cattle, fat | 0.02 |
| Cattle, meat by-products | 0.02 |
| Cattle, meat | 0.02 |
| Corn, forage | 1.5 |
| Corn, fresh, (sweet)(K+CWHR) | 0.1 |
| Corn, grain | 0.1 |
| Cottonseed | 0.1 |
| Eggs | 0.02 |
| Flax, seed | 3.0 |
| Flax, straw | 10.0 |
| Goats, fat | 0.02 |
| Goats, meat by-products | 0.02 |
| Goats, meat | 0.02 |
| Hogs, fat | 0.02 |
| Hogs, meat by-products | 0.02 |
| Hogs, meat | 0.02 |
| Horses, fat | 0.02 |
| Horses, meat by-products | 0.02 |
| Horses, meat | 0.02 |
| Milk | 0.02 |
| Peas, pods removed | 0.2 |
| Peas, forage | 1.5 |
| Poultry, fat | 0.02 |
| Poultry, meat by-products | 0.02 |
| Poultry, meat | 0.02 |
| Pumpkins | 0.1 |
| Sheep, fat | 0.02 |
| Sheep, meat by-products | 0.02 |
| Sheep, meat | 0.02 |
| Sorghum, fodder | 5.0 |
| Sorghum, forage | 5.0 |
| Sorghum, grain(milo) | 0.25 |

International Tolerances:

Presently, there are no tolerances for residues of propachlor in Canada, Mexico, or in the Codex Alimentarius.

Problems known to have occurred with use:

The Pesticide Incident Monitoring System (PIMS) did not show any incidents involving uses of propachlor.

4. Summary of regulatory position and rationale:

Based on the review and evaluation of all available data and other relevant information on propachlor, the Agency has made the following determinations:

The available data are insufficient to show that any of the risk criteria listed in § 162.11(a) of Title 40 of the U.S.Code of Federal Regulations have been met or exceeded for the uses of propachlor at the present time.

There are no valid long term chronic toxicity data for propachlor. Studies indicate that propachlor is structurally similar to alachlor which is oncogenic in laboratory rats and mice. Data on propachlor show that it is corrosive to the eye with corneal opacity irreversible after 7 days. Further, Propachlor has been shown to be highly toxic to coldwater fish, highly to moderately toxic to warmwater fish and highly to moderately toxic to freshwater invertebrates. In addition to the extensive subchronic and chronic toxicity data gaps, there are also residue chemistry and environmental fate data gaps. Because the existing data are insufficient to show that any of the risk criteria have been met or exceeded, the Agency is not initiating a Special Review at this time.

The most appropriate regulatory action is to move quickly to fill the data gaps. Then the Agency will make a determination as to the future registerability of the affected uses.

Specific label warning statement:

Hazard Information:

"DANGER. Corrosive, causes irreversible eye damage. Harmful if swallowed or absorbed. Do not get in eyes or on clothing. Wear goggles, face shield or safety glasses".

Protective Clothing Requirements:

"Required clothing and equipment for mixing/loading and applying propachlor":

"One-piece coveralls which have long sleeves and long pants constructed of laminated fabric as specified in the USDA/EPA Guide for Commercial Applicators".

"Goggles, face shield, or safety glasses".

"Liquid-proof hat such as a plastic hard hat with a plastic sweat sweat band".

"Heavy-duty liquid proof rubber (neoprene) work gloves".

"Any article worn while handling propachlor must be cleaned before reusing. Clothing which has been drenched or has otherwise absorbed concentrated pesticide from any significant spill must be disposed in a sanitary landfill, by incineration or, if allowed by state and local authorities, by burning. If burned, stay out of smoke".

"Instead of clothing and equipment specified above, the applicator can use an enclosed tractor cab which provides a filtered air supply (as described by Taschenberg and Bourke, 1975)".

Prohibition on Aerial Application

"Do not apply with aerial equipment."

Environmental Hazard Statements:

All manufacturing-use products (MUPs) intended for formulation into end-use products (EUPs) must bear the following statement:

"Do not discharge effluent containing this product directly into lakes, streams, ponds, estuaries, oceans or public waters unless this product is specifically identified and addressed in a National Pollutant Discharge Elimination System (NPDES) permit. Do not discharge effluent containing this product into sewer systems without previously notifying the sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the Environmental Protection Agency".

The following environmental hazard statement must appear on all granular EUPs:

"This pesticide is toxic to fish. Do not apply directly to water. Runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water by cleaning of equipment or disposal of wastes. In case of spills, collect for use or properly dispose of granules".

The following environmental hazard statement must appear on all non granular EUPs:

"This pesticide is toxic to fish. Do not apply directly to water. Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water by cleaning of equipment or disposal of wastes. In case of spills, collect for proper disposal".

Registrants must revise the labeling of MUPs and EUPs as specified in the "Required Labeling" section on products released for shipment as of September 1, 1985.

5. Summary of major data gaps:

The following toxicological studies are required:

An acute inhalation toxicity study in the rat,
A dermal sensitization study in the rabbit, *
A 90-day dermal study in the rabbit,
A 90-day inhalation study in the rat,
A 90-day feeding study in rodent, and non-rodent,
A chronic toxicity study in rat and in dog is required by February 1987,
An oncogenicity study in rat and in mouse is required by February, 1987,
A teratology study in the rabbit is required by April 1985, **
A two generation reproduction study in the rat is required by February 1987.
The following mutagenicity data are required by January, 1987:
In vitro mammalian cell point mutation [L5178Y (TK): or CHO(HGPRT) or V79(HGPRT)],
In vitro cytogenetic damage: both chromosomal aberration and SCE (in CHO cells: or human lymphocytes: or other rodent/ human cell line/ strains),
In vitro/ in vivo primary hepatocyte repair for UDS testing both in vivo and in vitro exposure of cells to alachlor,
In vivo cytogenetics test for chromosomal aberrations using bone marrow preparations of rats, and
Dominant lethal test in rats or mice.
A domestic animal safety study is required.

* A dermal sensitization study in guinea pigs (Acc. 255806, December 1984) has been received by the Agency and it is being reviewed.
** A teratology study in rabbits (Acc. 255758, November 1984) has been received by the Agency and it is being reviewed.

The following environmental fate data are required:

A hydrolysis/degradation study is required by July, 1985,
A photodegradation study in water is required by July, 1985,
A photodegradation study on soil is required by July, 1985,
An additional metabolism test in aerobic soil is required by July, 1986,
Additional data on mobility of degradates from aged propachlor are required by April, 1985,
Soil dissipation data are required by July, 1987,
An accumulation study in rotational crops (confined): and
A flow-through/accumulation test in fish is required.

The following ecological effects data are required:

An acute freshwater fish toxicity test on a cold water species may be required pending review of environmental fate data which will be submitted in 1985, 1986 and 1987.

The following product chemistry data are required:

A complete statement of composition,
A preliminary analysis,
A certification of limits,
Analytical Methods for Enforcement of Limits,
The Octanol/water partition coefficient, and
The pH of the TGAI is required.

The following residue chemistry data are required:

$^{14}C$ ring labeled data with corn and sorghum up to the seed stage,
$^{14}C$ ring labeled data on the nature of the residue in ruminants,
Metabolism data on propachlor in poultry,
Metabolism data on propachlor in non-ruminants (name/species),
A radiocarbon study in which samples are analyzed simultaneously by cold and hot analytical methodology for N-isopropylaniline moiety including a comparison of the results
[If other metabolites are found in or on plants and in animals, then an enforcement method to determine these residues would be required]:
Storage stability data on propachlor residues in plant and animal samples,
Residue data on the metabolites of propachlor in plants,
Residue data on the metabolites of propachlor in animals,
Residue data on the metabolites of propachlor in poultry and eggs,
A cow feeding study on propachlor,
Geographical representation of residue data are not adequate, therefore, additional field residue data are required:
Residue data on corn forage to support the application rate of 6 lb ai/A on soils with an organic matter content of more than 3%,
Additional residue data for corn fodder using the 20% granular formulation,
Residue data for corn grain using the 20% granular and 42% flowable liquid formulations,
Residue data for sweet corn using the flowable liquid concentrate (FlC),
Residue data for the oil and milling fractions from the processing of treated corn or sorghum grain,
Residue data in cotton forage are required, [but an acceptable alternative would be a restriction against the grazing of livestock on cotton forage]:
Residue data in flax seed hulls which are fed to livestock,
Residue data for peas using the flowable liquid concentrate,
Residue data for pumpkins using the 90-day pre-harvest or post-harvest interval (PHI): and
The feeding rate data in the sheep study must be clarified.